

# Polyurethane Resins for Laminating (and Surface Printing) Inks

Cognis is a leader in providing tin-free, film-forming, aliphatic thermoplastic polyurethane resins to the Graphic Arts industry. The rapid growth of this technology has been directly related to the growth of polyester-foil / metallized film laminates. Cognis' resins are designed for universal laminating ink systems for flexo and gravure printing, they exhibit excellent solvent release, good smear resistance and adhesion and cohesion strength in both adhesive and extrusion laminates. These resins can also be formulated to work well in surface printing applications.

Products	Special Properties	Application Type			Technical Data							Crinkle Resistance Tests <sup>5,6</sup> (10 = Best)			Tape Adhesion <sup>7</sup> (10 = Best)	
		Laminating Flexo Inks	Laminating Gravure inks	Surface Printing Inks	% Solids	Solvent	Tin-free	Viscosity mPa.s <sup>1</sup>	Gardner Color <sup>2</sup>	Gel Point °C <sup>3</sup>	Nitrocellulose Compatibility <sup>4</sup>	Ice Water Resistance (Treated Polyester)	Dry Crinkle Resistance (Treated Polyester)	Dry Crinkle Resistance (Polyethylene)	Treated Polyester	Treated Polypropylene (BOPP)
<b>Versamid PUR 1010</b>	Excellent cohesion, flexibility and adhesion to a variety polyolefin, polyester, polymer coated, and metallized films and has excellent solvent release.	●	●		35	n-Propanol-21%; n-Propyl Acetate-44%	Yes	800	2	0	Yes <sup>8</sup>	10	10	10	9	10
<b>Versamid PUR 1011</b>		●			35	n-Propanol-45%; n-Butyl Acetate-20%	Yes	1000	2	0	Yes <sup>8</sup>	10	10	10	9	10
<b>Versamid PUR 1032</b>	Excellent cohesion, flexibility and adhesion to a variety polyolefin, polyester, polymer coated films.		●		45	Ethanol-40% Ethyl Acetate-15%	Yes	1700	2	5	Yes <sup>8</sup>	10	10	10	9	10
<b>Versamid PUR 1120</b>	Improved hardness, heat resistance and N/C compatibility	●	●	●	42	i-Propanol-48%; n-Propyl Acetate-10%	Yes	550	1	-5	Yes	10	10	10	8	10
<b>Versamid PUR 1132</b>	Improved hardness, heat resistance and N/C compatibility		●	●	50	Ethanol-40%; Ethyl Acetate-10%	Yes	750	2	0	Yes	10	10	10	8	10

- (1) Viscosity at 25° C of varnish in listed solvent using Brookfield DVIII Viscometer #21 spindle
- (2) Color for polyamides tested at 40% total non-volatiles, in 1/1 toluene/n-butanol. Polyurethanes tested as supplied.
- (3) Gel Point, in °C, defined as the maximum temperature at which resin solution will no longer flow when inverted.
- (4) Nitrocellulose Compatibility tested at 4 to 1 Resin to N/C (Hercules SS 1/4") solids in 60/40 n-propanol/n-propyl acetate.
- (5) Ice Water Resistance rated after soaking varnish-printed film in ice water for 16 hours and crinkling for 100 cycles

- (6) Dry Crinkle Resistance evaluated by crinkling printed film for 100 cycles (10 = Best and 1 = Worst).
- (7) Tape adhesion measured using 3M brand 610 tape (10 = Best and 1 = Worst).
- (8) Varnishes are compatible, but discoloration and viscosity increase observed over time.
- (9) Ball & Ring Softening Point.
- (10) Melt Viscosity measured using Brookfield DVIII Viscometer #27 spindle at 160° C, except where noted.



# Polyamide Resins for Laminating (and Surface Printing) Inks

Cognis specializes in offering thermoplastic polyamide resins that have been successfully used by the Graphic Arts Industry for more than 20 years to make universal laminating inks for flexo/gravure printing. These resins exhibit excellent solvent release, smear resistance, flexibility, cohesion and adhesion to various substrates. In addition, the white inks based on Versamid 973 are extensively used as back-up whites for nitrocellulose based colors.



Products	Comments/Advantages	Technical Data					Solution Viscosity at 20% Solids, mPa.s <sup>1</sup>			Crinkle Resistance Tests <sup>5,6</sup> (10 = Best)			Tape Adhesion <sup>7</sup> (10 = Best)	
		Softening Point °C <sup>9</sup>	Melt Viscosity, mPa.s <sup>10</sup>	Gardner Color <sup>2</sup>	Termination	Nitrocellulose Compatibility <sup>4</sup>	n-Propanol - 99.5%	n-Propanol / Naphtha / H <sub>2</sub> O (68/30/2)	Ethanol / Heptane / H <sub>2</sub> O (68/30/2)	Ice Water Resistance (Treated Polyester)	Dry Crinkle Resistance (Treated Polypropylene)	Dry Crinkle Resistance (Treated Polyester)	Treated Polyester	Treated Polypropylene (BOPP)
<b>Versamid 971</b>	Similar properties to <b>Versamid 973</b> with lower solution viscosity to provide higher solids and pigment load. Inks based on <b>Versamid 971</b> exhibit higher color strength, higher gloss, excellent solvent release and smear resistance.	141	3700 (225 °C)	5	Amine	No	75	63	30	10	10	10	10	10
<b>Versamid 972</b>	A N/C compatible version of <b>Versamid 973</b> with improved resistance to yellowing in white inks. It has excellent cohesive properties and develops good adhesive strength to a variety of films and foils.	138	5000 (210 °C)	4	Acid	Yes	70	50	30	10	10	10	10	10
<b>Versamid 973</b>	Industry standard, "universal" laminating ink resin for formulating inks with adhesion to a wide variety of substrates and is compatible with a broad range of adhesives. Inks formulated with <b>Versamid 973</b> exhibit excellent heat resistance, excellent solvent release and smear resistance.	138	7000 (225 °C)	4	Amine	No	140	110	60	10	10	10	10	10

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For reference numbers refer to opposite side

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